

[COMMUNICATION]

***Copidognathus papillatus* Krantz (Acari, Halacaridae),
a Hydrothermal Vent Mite in the Pacific Ocean**

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ABSTRACT—The description of *Copidognathus papillatus* Krantz, 1982, is emended. This species, first recorded from the Galapagos Rift, eastern Pacific Ocean, has been recovered from three widely separate hydrothermal vent communities in the eastern and western Pacific Ocean.

INTRODUCTION

Hydrothermal vents are fissures and chimneys on ridges along sea-floor spreading axes. They are often surrounded by a rich fauna: dense clusters of bivalves, vestimentiferans, polychaetes, sponges, actinarians and antipatharians, with a conspicuous vagile macrofauna (crabs, lobsters, shrimps, limpets), and a meiofauna rich in species and numbers; amongst others halacarid mites are known to occur [1-5].

Copidognathus papillatus was the first halacarid mite recorded from a hydrothermal vent community. The mites were found associated with mussel clumps raked from the walls of a submarine vent in the Galapagos Rift (1°N 86°W) at a depth of almost 2500 m [1].

MATERIALS AND METHODS

In recent years, I have received material from three cruises to Pacific spreading centers, from:

The HYDRONAUT cruise, to the East Pacific Ridge, organized by the IFREMER DERO/EP. From October to December 1987, almost 30 dives were made with the submersible "Nautil", operated from the R/V "Nadir", along the East Pacific

Ridge, between 12°45'N and 12°50'N, 103°56'W. Chief scientist of this part of the cruise was A. M. Alayse. The goals were to study the biology, ecology and physiology of hydrothermal vent organisms.

The BIOLAU cruise (Biologie-Bassin de Lau), in May 1989, at the Valu Fa Ridge, Lau Basin (22°S 177°W, 1900 m), organized by the IFREMER DERO/EP, chief scientist A. M. Alayse. Twelve dives were done with the submersible "Nautil" which was operated from the R/V "Nadir". The main purpose of the dives was to study the organisms associated with hydrothermal zones.

The STARMER II cruise, under the auspices of STA (Science and Technology Agency, Japan) and IFREMER (Institut Français pour l'Exploitation de la Mer, France), was a Franco-Japanese project devoted to submersible exploration of active vents in the North Fiji Basin, Southwest Pacific. Twelve dives with the French submersible "Nautil", operated from the R/V "Nadir" (co-chief scientists D. Desbruyères, Plouzané and S. Ohta, Tokyo) were made in July 1989, the main goals were to study the biology, geology and geochemistry in the vicinity of the active chimney "White Lady" (17-18°S, 173-174°W).

All the biological material was sorted by the Centre National de Tri d'Océanographie Biologique (CENTOB, Brest).

Abbreviations used in the descriptions: AD anterior dorsal plate; AE anterior epimeral plate; d dorsal setae on idiosoma, d-2 second pair of dorsal setae; GA genitoanal plate; gp gland pore; GO genital opening; OC ocular plate(s); pa porose areola; PD posterior dorsal plate; PE posterior epimeral plate; pgs perigenital setae; sgs subgenital setae.

Specimens are deposited in the Muséum National d'Histoire Naturelle, Paris (MNHN), and the National Science Museum, Tokyo (NSMT).

SYSTEMATICS

Subfamily Copidognathinae Bartsch, 1983

Genus *Copidognathus* Trouessart, 1888

Copidognathus papillatus Krantz, 1982

Material. One female (MNHN), East Pacific Ridge, 12°48'52N, 103°56'48W, 2630 m (HYDRONAUT, PL 227, site PARIGO).—One female, 1 male (MNHN), Lau Basin, south of Hine Hina, 22°32'S, 176°43'W, 1914 m, cold area with 2–2.5°C, dominating organisms were cirripedes, echiuroids, vestimentiferan tube-worms, gastropods (BIOLAU, BL 07).—One female, 1 male, 1 protonymph (all in NSMT); 1 female, 1 male, 1 protonymph, 1 larva (all in MNHN); 3 females, 5 males, 5 protonymphs, 2 larvae, North Fiji Basin, site active "White Lady" (Kaiyo 87), 18°50'S, 173°29'W, 2750 m (STARMER II, Station 14, PL 19).

Diagnosis (adults). Idiosoma length 395–460 μm . Dorsal plates with areolate-reticulate pattern and raised areolae with numerous delicate canaliculi. AD with a small anterior and a large median areola, PD with 4 costae. Membranous integument anastomosing and squamose. Setae d-2 inserted within striated integument, d-3 on the PD, d-6 at lateral flank of the prolonged anal papilla. Ventral plates punctate. GO large. Ovipositor reaching almost to anterior margin of GA. Spermatopositor extending to or beyond anterior margin of GA. Male GA with 12–13 pairs of pgs. Rostrum narrow. Legs with aciculate reticulation. Fossary setae on tarsus II unequal in length. Tarsus III with 4 dorsal setae, tarsus IV with 3 setae.

Description. Female. Idiosoma length (more or less raised anal papilla excluded): 430 μm (specimen from Galapagos Rift [1]), 453 μm (East Pacific Ridge), 460 μm (Lau Basin), 395–428 μm (North Fiji Basin). Anterior margin of AD slightly protruding (Fig. 1). Dorsal plates (in cleared specimens) with a conspicuous reticulation; within raised areolae, the integument is pierced by numerous delicate canaliculi (Fig. 2). AD with a small anterior and a larger posterior raised areola, OC with a round raised areola, PD with distinct medial and inconspicuous lateral costae. OC lack corneae. Gland pores distinct (in cleared specimens). Marginal areas of ventral plates areolate, ventral portions of plates evenly punctate.

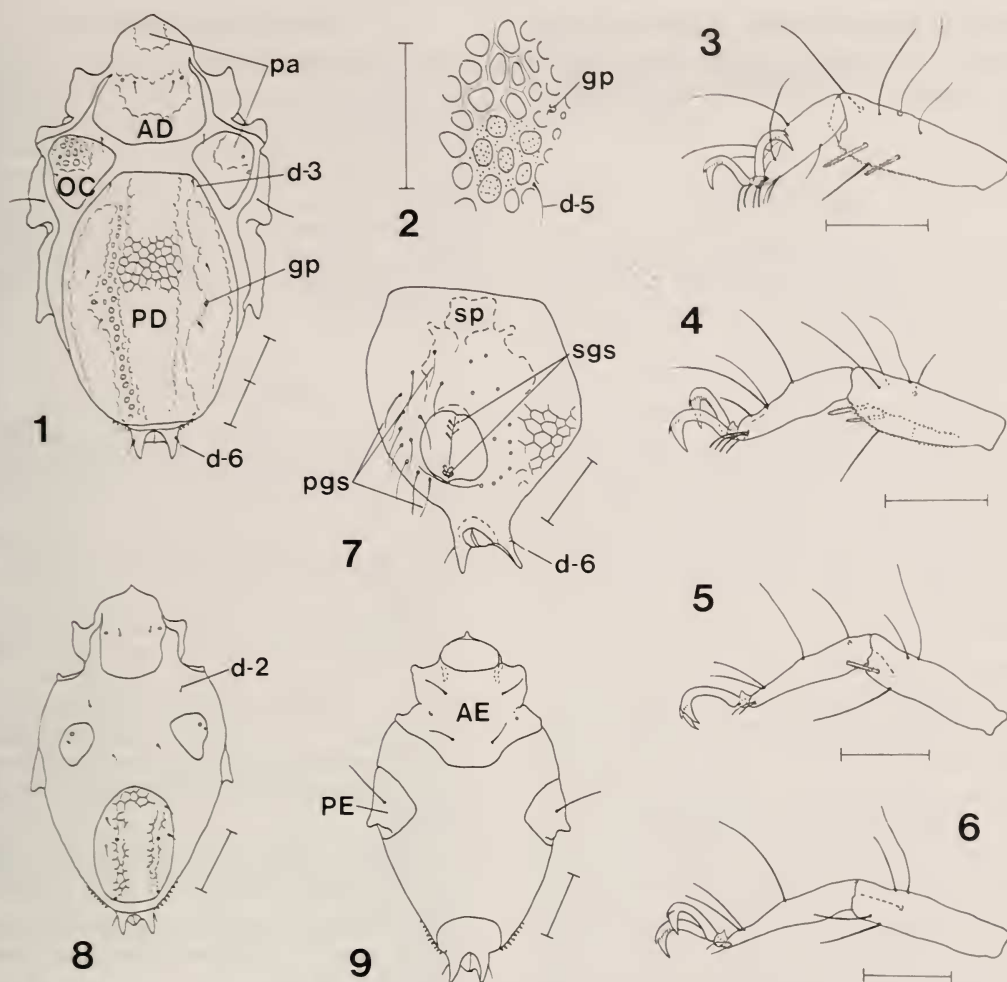
Gnathosoma slender. Rostrum narrow, parallel-sided, shorter than gnathosoma base. Rostral sulcus almost extending to pair of maxillary setae.

Legs slender. Telofemora with aciculate reticulation. Ventral margins of tibiae I and II (Figs. 3, 4) and all telofemora with rows of small cuticular dents. Fossary setae on tarsus II unequal in length (Fig. 4). Tarsus III with 4 dorsal setae (Fig. 5), tarsus IV with 3 setae (Fig. 6). Tibia III with the ventromedial bristle bipectinate, the ventral bristle smooth, tapering. The ventromedial bristle on tibia IV is, within one population, in some specimens delicately bipectinate in others smooth; the ventral bristle is smooth. Membranes of claw fossa present though indistinct. (For more details see Krantz [1]).

Male. Idiosoma length 412 μm (Lau Basin), 395–428 μm (North Fiji Basin). Similar to female except for genital region. Anterior margin of GA truncate. GO large, slightly raised; surrounded by 24–26 pgs. Spermatopositor large, extending almost to or slightly beyond anterior margin of GA (Fig. 7). Two posterior pairs of subgenital setae short, spur-like; 2 anterior pairs (rarely 2 1/2 pairs) of setae very slender.

Protonymph. Idiosoma length 328–377 μm (North Fiji Basin). Dorsal plates distinctly smaller than in adults. Reticulate ornamentation present, porose areolae not as distinct as in adults.

Larva. Idiosoma length 179–261 μm (North Fiji Basin). Dorsal plates small; d-3 inserted within striated integument (Fig. 8). Dorsal membranous integument squamose. Genital plate absent (Fig.



FIGS. 1–9. *Copidognathus papillatus* Krantz, 1982. 1, idiosoma, dorsum, female; 2, detail of right posterior dorsal plate, at level of d-5; 3, tibia and tarsus I, medial aspect, female; 4, tibia and tarsus II, lateral aspect, female; 5, tibia and tarsus III, medial aspect, female; 6, tibia and tarsus IV, medial aspect, female; 7, genitoanal plate, male; 8, idiosoma, dorsum, larva; 9, idiosoma, venter, larva. (AD anterior dorsal plate; AE anterior epimeral plate; d dorsal setae on idiosoma, d-2, d-3, d-5, d-6 second, third, fifth and sixth pair of dorsal setae; GA genitoanal plate; gp gland pore; OC ocular plate; pa porose areola; PD posterior dorsal plate; PE posterior epimeral plate; pgs perigenital setae; sgs subgenital setae; sp spermatopositor) Each scale division = 50 μ m.

9). AE with 2 pairs of setae, and PE with one ventral seta. Rostrum not as attenuate as in adults and protonymph. Cuticular dents along ventral margins of femora very faint. Tibiae I and II each with a short, pectinate ventromedial bristle and a smooth ventral one. Tarsus III with 4 dorsal setae.

Remarks. The specimens from the three vent sites accord well with the original description, based on specimens recovered from the eastern

Pacific. Idiosoma length (protruding anal papillae excluded) of the eastern Pacific females is 430–450 μ m, that of the western Pacific females 395–460 μ m. In some specimens, the AD is slightly more protruding (due to a small, raised frontal spine), in other specimens, the anterior margin is evenly rounded, as described in Krantz [1: Fig. 2]. The gland pores are distinct in cleared specimens; they may be difficult to recognize in uncleared mites.

The ratio of rostrum length to gnathosoma length is found to be variable, but the measurement is highly dependent on orientation of the gnathosoma.

DISCUSSION

Numerous species characteristic of hydrothermal vent macrofauna are recorded from two or more, geographically isolated, sites; the majority assumedly with free-swimming larval stages [6]. On the other hand, Tunncliffe [3], when comparing lists of two disjunct active vent faunas in the eastern Pacific, found clear differences between the northern (Juan de Fuca Ridge, 45–48°N) and the southern (East Pacific Rise, 11–21°N) site, with high number of endemisms at the species level. Western Pacific hydrothermal vents are often inhabited by similar but distinct species, an example is the crab genus *Austinograea*, with *A. williamsi*, found in the Mariana Back-arc Basin [7], and *A. alayseae*, present in the Lau Basin [8].

Halacarids are strictly benthic organisms, dispersal stages are not known. Still, *Copidognathus papillatus* seems to be a common inhabitant in widely separate Pacific hydrothermal sites. Analyses of the external morphology showed no marked differences between specimens from the western and the eastern Pacific Ocean. However, knowledge of the deep-sea halacarid fauna is rather poor [9] and it cannot be excluded that *C. papillatus* is rather eurytopic, common also in non-vent habitats.

Beside *Copidognathus papillatus*, the halacarid species *Lohmannella* sp. was found in the North Fiji Basin (STARMER II cruise, PL 21). The specimen is extremely similar to *L. cygna* Bartsch, 1988. The description of *L. cygna* is based on a single female specimen, taken in the South Atlantic Ocean from approximately 9°S, 12°E and 1500 m depth [9]. For detailed morphological analyses and comparison of these assumedly separate species more material from both sites is necessary.

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